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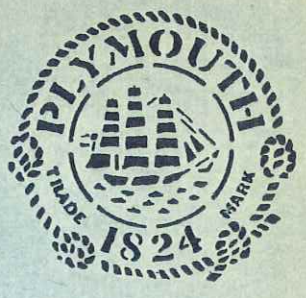
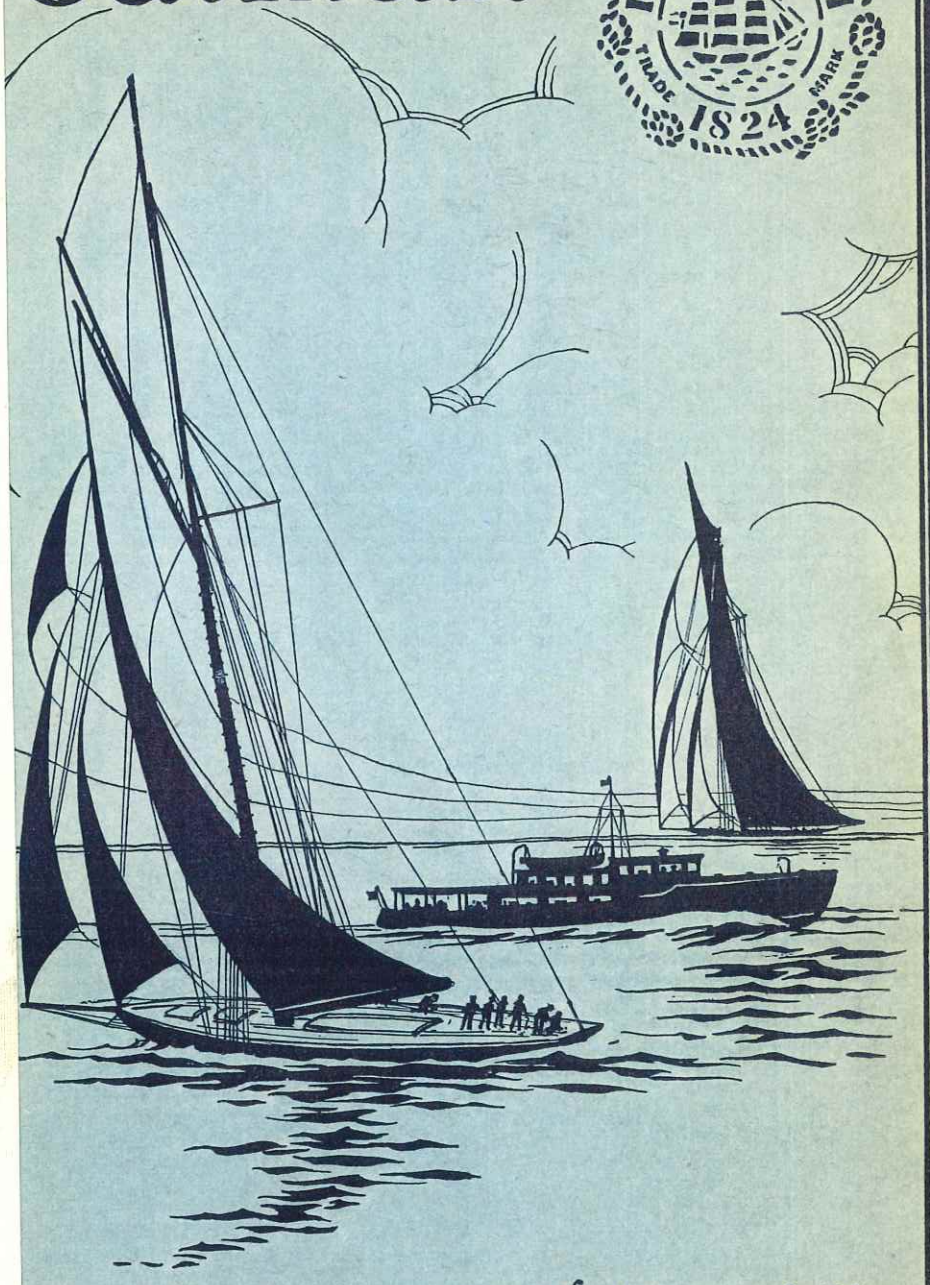
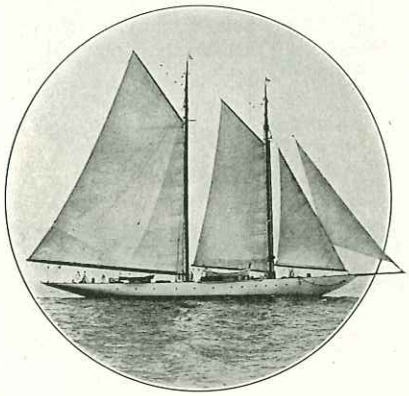
ROPE *for the* Boatman





OUTH CORDAGE CO. *North Plymouth, Mass.*

ROPE *for the* BOATMAN



THE BEAUTIFUL SCHOONER YACHT " ENCHANTRESS," OWNED BY MORGAN ADAMS OF THE CALIFORNIA YACHT CLUB, IS RIGGED WITH PLYMOUTH MANILA YACHT ROPE

PLYMOUTH CORDAGE COMPANY, Plymouth, Mass.
" *North Plymouth, Mass. · Welland, Can.*

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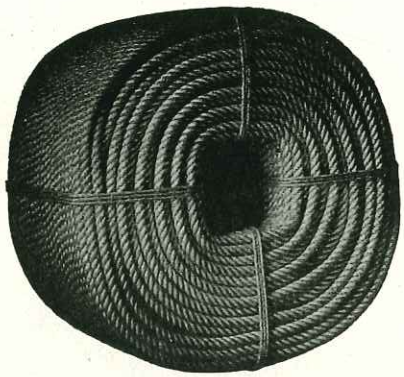
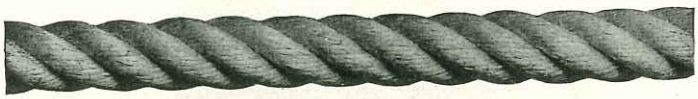
Plymouth Manila Yacht Rope





Section — One-Half Actual Size — and Coil Plymouth Manila Yacht Rope, Four-Strand, Three-Fourths Inch Diameter

THIS is designed for the running rigging of pleasure yachts and other small craft, and is probably more widely used for that purpose than any other rope on the market.

It is furnished either three-, four-, or six-strand, the last type being regularly made with a heart, and the four-strand rope having it if desired, in the larger sizes.

Made from the finest grade of Manila fiber grown and treated with the greatest care in curing, giving much greater resistance to deterioration and abrasive wear.

The lay is medium soft, insuring easy handling.

Standard coils, both three- and four-strand, measure 200 fathoms (1200 feet). Standard coils of six-strand measure 166⅔ fathoms (1000 feet).

Fitting-Out Time

BOAT owners each year look forward to opening of the spring season when overhauling and refitting their craft are the order of the day. Many boatmen do their own work — scraping, painting, repairing and fitting out, — deriving fully as much pleasure from the task as in the actual operation of the boat itself.

Irrespective of whether your boat is hauled out and refitted at some boat shop, or whether you do the work yourself, the need of reliable Manila rope for mooring and anchor lines, deck lines for towing emergencies, and running rigging as well, if yours is a sailing craft, is of sufficient importance to receive the careful consideration of the owner.

Most yachtsmen, and the boating public in general, realize the superior quality of Plymouth Ship Brand Manila Rope. What is standard for the Cup Defenders may be relied upon for extra strength, superior finish and fine appearance, easy handling, and reliable, economical service for the individual enthusiast.

In procuring your supplies of Cordage it will be decidedly to your advantage to insist upon having Plymouth Manila Rope, Bolt Rope or Yacht Rope, as your requirements and preference may call for. Any boat builder, repair-yard or marine supply dealer handling boat supplies is in position to readily obtain Plymouth Rope, which will insure you a safe anchorage and a season free from worry.

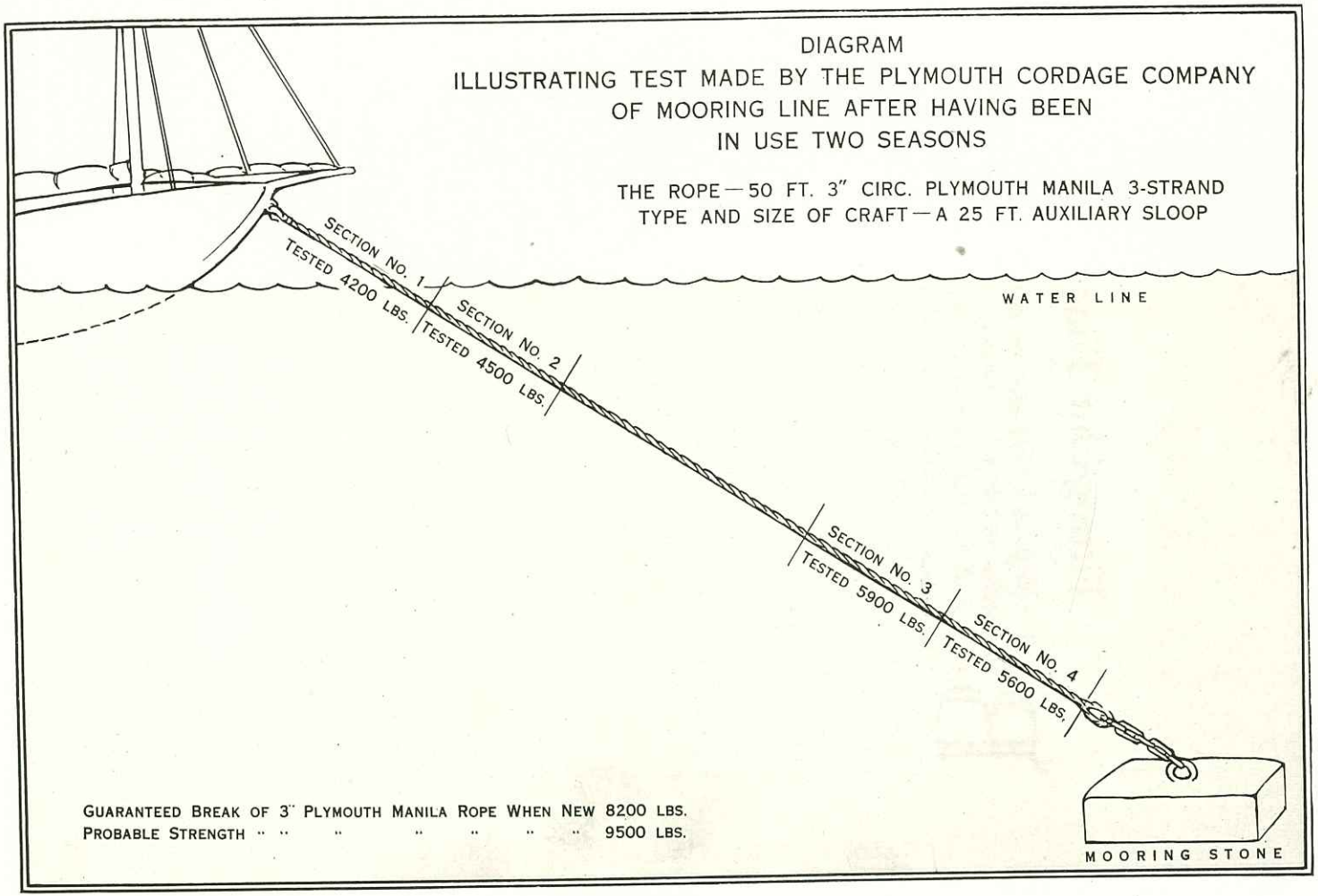


DIAGRAM
ILLUSTRATING TEST MADE BY THE PLYMOUTH CORDAGE COMPANY
OF MOORING LINE AFTER HAVING BEEN
IN USE TWO SEASONS
THE ROPE — 50 FT. 3" CIRC. PLYMOUTH MANILA 3-STRAND
TYPE AND SIZE OF CRAFT — A 25 FT. AUXILIARY SLOOP
WATER LINE
SECTION NO. 1
TESTED 4200 LBS.
SECTION NO. 2
TESTED 4500 LBS.
SECTION NO. 3
TESTED 5900 LBS.
SECTION NO. 4
TESTED 5600 LBS.
MOORING STONE
GUARANTEED BREAK OF 3" PLYMOUTH MANILA ROPE WHEN NEW 8200 LBS.
PROBABLE STRENGTH " " " " " " " 9500 LBS.

Watch Your Moorings!

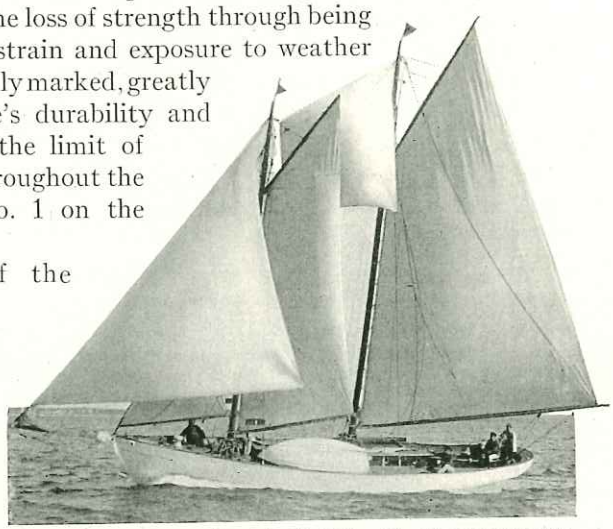
BOAT owners often ask the question, How long can we safely trust our mooring line?

"Never more than two seasons," according to the experience and observation of one well versed in rope and its uses. He also adds, "And if your boat is on the mooring during an autumn gale, you had best be down on the shore at the top of the tide to meet her when she comes in." If your boat goes adrift, the chances are there will be four or five feet of the mooring line hanging to the stem, indicating faster deterioration of the rope "between wind and water" than at any other given section of the line.

The diagram opposite is complete evidence of the correctness of the opinion advanced, and interestingly charts the results of a series of tests recently made of a fifty-foot mooring line, three inch circumference, after having been used two seasons on a twenty-five-foot auxiliary-sloop. It was fitted with topsail sheet hook to make fast to the boat, and thimble-spliced at the lower end to secure same to the mooring chain. The rope was taken in, dried out, and tested in our laboratory. Four different sections of the line were tested for strength with the varying results as indicated.

While the rope when new had a guaranteed minimum tensile strength of 8200 pounds and a probable strength considerably in excess of that figure, the loss of strength through being subjected to heavy strain and exposure to weather conditions is decidedly marked, greatly impairing the rope's durability and seriously affecting the limit of safety, especially throughout the section marked No. 1 on the chart.

Replacement of the mooring line after two seasons of use is undoubtedly the better part of wisdom, insuring both peace of mind and immunity from trouble and loss.



The "Kumalong," owned by John W. Ripley, Vice-Commodore of the Bayside Yacht Club, Bayside, L. I., is rigged throughout with Plymouth Manila Yacht Rope

Ground Tackle

THE far-sighted yachtsman or motor-boat man never neglects to take along suitable ground tackle. It is as vital as compass and chart.

You may be dismasted, or your engine may balk. You may get into a tight place from any one of a lot of causes, but given a sound bottom under your feet, reliable anchors and reliable lines constitute pretty good insurance against serious trouble.

This need for suitable and *reliable* ground tackle applies to the boat which cruises inshore just as much as to sea-going craft. In fact, it is along shore that the sort of situation is most often found which calls for ground tackle. There is nothing worse than to be disabled on a lee shore. Then is the time when a good solid anchor and a few fathoms of stout Manila are the only things that fill the bill. With your cable well made fast, there's a heap of satisfaction in seeing everything holding while you make repairs.

Don't neglect your ground tackle because your boat is a small one or because you don't go to sea. Every yacht and motor boat should carry at all times the necessary equipment for meeting emergencies. The man who fails to provide these things simply invites trouble. The man who attends to them and goes out in shipshape fashion makes his sport safer, gets more real enjoyment from it and feels, besides, a personal pride in the efficiency of his boat.

As a help to our many boating friends, we have prepared the tables on page 7 covering suitable ground tackle for different-sized craft. They are the combined result of close study of all information published on the subject and of an extended personal investigation in which ten principal boating centers, typical of as many sections, were considered.

In two columns under each kind of craft we show the sizes of anchor rope advisable in Plymouth Manila or other strictly high-grade Manila rope. The columns in heavy-faced type show the smaller sizes which can be safely substituted if you use Plymouth *Bolt Rope*.

We especially recommend Plymouth Bolt Rope for all equipment which does not call for our special Yacht Rope. It is peculiarly adapted to the most important requirement of yacht and motor-boat use — the need for a line of great strength and durability that will stow in the smallest space possible.

Over All Length of Boat	POWER CRAFT — FOR LIGHT ANCHOR — Length of Cable	Diam. if 1st Class Manila	Diam. if Plymouth Bolt Rope	POWER CRAFT — FOR HEAVY ANCHOR — Length of Cable	Diam. if 1st Class Manila	Diam. if Plymouth Bolt Rope	SAILING CRAFT — FOR LIGHT ANCHOR — Length of Cable	Diam. if 1st Class Manila	Diam. if Plymouth Bolt Rope	SAILING CRAFT — FOR HEAVY ANCHOR — Length of Cable	Diam. if 1st Class Manila	Diam. if Plymouth Bolt Rope
Under 20′	100′	½″	7/16″				100′	½″	7/16″			
20′—25′	100′	½″	7/16″	150′	⅝″	9/16″	125′	½″	7/16″	200′	⅝″	9/16″
25′—30′	100′	⅝″	9/16″	180′	¾″	5/8″	150′	¾″	5/8″	200′	¾″	5/8″
30′—40′	125′	¾″	5/8″	200′	1″	7/8″	150′	1″	7/8″	250′	1⅛″	15/16″
40′—50′	150′	1″	7/8″	250′	1⅜″	1-1/8″	200′	1¼″	1″	300′	1½″	1-1/4″
50′—65′	180′	1¼″	1″	300′	1½″	1-1/4″	200′	1⅜″	1-1/8″	300′	1⅝″	1-3/8″

Over All Length of Boat	POWER CRAFT — Light Anchor	POWER CRAFT — Heavy Anchor	SAILING CRAFT — Light Anchor	SAILING CRAFT — Heavy Anchor
Under 20′	20 lbs.		30 lbs.	
20′—25′	20 "	35 lbs.	30 "	40 lbs.
25′—30′	30 "	50 "	40 "	60 "
30′—40′	40 "	70 "	50 "	80 "
40′—50′	50 "	90 "	60 "	100 "
50′—65′	60 "	120 "	70 "	140 "

NOTES ON TABLES

These tables are intended as guides. Experienced boatmen will know when to vary the figures to suit individual cases. For the less experienced, certain facts are worth noting.

Sailing craft require heavier gear than power craft because they lie more on the surface and tug harder.

Wide, flat boats, racing craft with long overhang and boats with high freeboard, high cabin house or much top hamper, offer more resistance and require heavier gear than boats of same size having less surface exposure. Displacement alone cannot be taken as a guide.

Yachts entered in a race are required to carry an anchor and suitable cable. Weights and sizes for different classes are described in rules of various clubs and associations.

Cable lengths given are based on general conditions along Atlantic coast and are the minimum lengths advisable under these or similar conditions. Local conditions of weather and water sometimes make longer lengths necessary.

Anchor weights given are based on information from various sources but, as we are not anchor specialists, may be open to some variation. Some authorities recommend a light, an ordinary and a heavy anchor. The light anchor of our table falls about midway between the first two in weight.

Heavy gear figures for boats under 20′ are not given, as such craft usually frequent waters where the light gear answers every purpose. However, when any small boat goes to sea or cruises where the water offshore is bold, she places herself in the same class as larger boats and should govern herself accordingly.

Plymouth Bolt Rope is manufactured from specially selected Manila fiber of extra high quality. This makes it so much stronger and longer-lived than regular Manila rope that, as we have pointed out, you can get the same service from smaller sizes and thus save room and weight as well as cost. We build this rope just right for easy handling, while its fine appearance is a credit to any boat.

The lighter anchor and the smaller line suggested in each case are for the working equipment in which lightness and handiness are considered. The heavier anchor and larger line form the spare equipment which every boat should also carry and which must be capable of holding her in any emergency. You will sleep better when cruising if you always put down your heavy gear at night.

The sizes of craft covered are those which experienced authorities generally agree can use rope more advantageously than chain cable. In the case of larger craft, the owners of which prefer rope to chain, we shall be glad to take up the question of proper sizes individually.

An anchor holds best when the stock is lying flat on the bottom or nearly so and the cable leading up to the boat in a long gradual curve with a pronounced sag at the lower end so that the pull upon the anchor is horizontal.

With your gear in this position, the strain on the anchor simply makes the flukes dig in all the harder. The jerk imparted to the cable by the pitching and irregular tugging of the boat does not travel the cable's whole length and the strain on the anchor is steady, as it should be. It is because of the foregoing that even the smallest boat should carry plenty of rope and *use* it. When anchoring over night or for any longer period, the length of rope paid out should be from three to five times the depth of the water. The higher the wind and the heavier the sea,

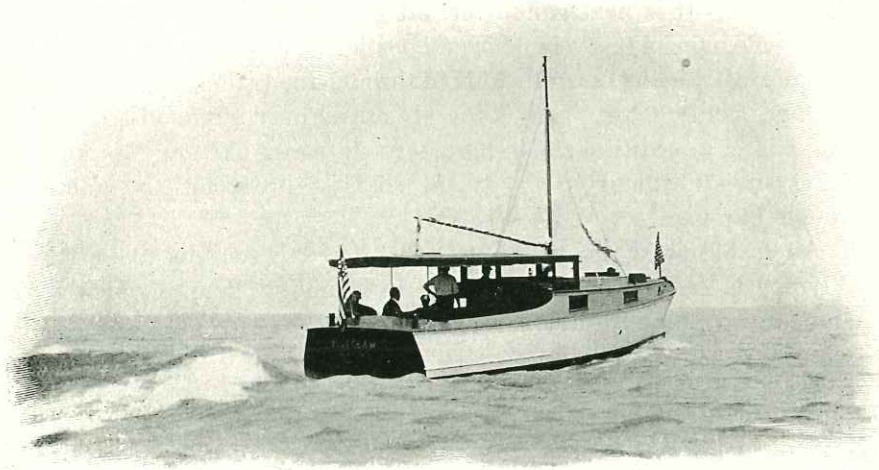
The Anchor Lines furnished with all models of the Chris-Craft line of water runabouts are Plymouth Manila Rope. Chris Smith & Sons Boat Company, of Algonac, Mich., overlook no opportunity to offer dependability in every specification.

the greater the amount of rope that should be paid out. A further method of preventing jerks on the anchor, when you are lying in an exposed spot, is to fasten a sand bag or other convenient weight around the cable by means of a small rope becket, tie another rope to the weight for recovering it and let the weight slide down the cable a considerable distance. The weight acts as a buffer or shock absorber.

If your boat is swinging at anchor a good deal, so as to make the cable chafe against the stem of the boat, the stays, chocks or hawse-pipes, it is a wise precaution to protect the cable at that point by wrapping it with a piece of canvas or burlap.

The holding power of an anchor is greatly reduced by the cable becoming foul of the shank or stock, and such fouling naturally occurs when a boat is swinging at anchor through a considerable period. For this reason, it is worth the trouble, during any lengthy stay to weigh anchor once a day in order to clear the turns.

To make it easier to free your anchor from a rocky bottom, it is a good plan to attach to the back of the crown or the bottom of the shank a small tripping line with which to lift out the flukes. This line should always be paid out so as to allow plenty of slack and thus prevent any strain on it from tripping the anchor accidentally.



MATTHEWS STANDARDIZED CRUISERS ARE PLYMOUTH EQUIPPED

All Matthews Standardized Cruisers are supplied with the necessary rope equipment

For the 38′ and 46′ cruisers there is furnished: 3 — 40 ft. ¾″ Mooring Lines; 1 — 125 ft. 1″ Anchor Line —all 3-strand Plymouth Manila Rope. In addition, there is considerable ⅜″ diam. rope used in connection with the auxiliary sail rig on the 38′ cruisers

Running Rigging

MOST yachtsmen want something extra fine for running rigging — something not only stronger and more durable than common Manila rope, but the last word in finish and appearance as well.

This desire is quite natural for any man to have who takes pride in his boat. It's the same feeling that accounts for tidy decks, glistening spars, brass work that shines, and sails that set just right.

To meet this widespread demand, we have for many years manufactured a special product known as Plymouth Yacht Rope. It is made from the cream of literally hand-picked Manila fiber, chosen from packers' marks of the finest quality known to rope-makers. No rope is the subject of greater care in the manufacturing processes.

When the native Filipino sees a few strands of fiber of a particularly fine texture and whiteness, he separates them from the rest and carefully treasures them. Gradually, other strands of the same unusual character are added until there is enough to form a hank. In time, a complete bale is hoarded together and shipped to our mills. Here, this finest of all Manila fiber is subjected to rigid inspection. It is next gone over, bit by bit, by our most trusted men, who painstakingly remove any portions not up to our standard. Finally, after being carefully worked through the various machines, it emerges as Plymouth Yacht Rope. In appearance, Plymouth Yacht Rope is of a beautiful silky character. It wears like rawhide and is as unlike ordinary rope as the choicest broadcloth is unlike rough burlap.

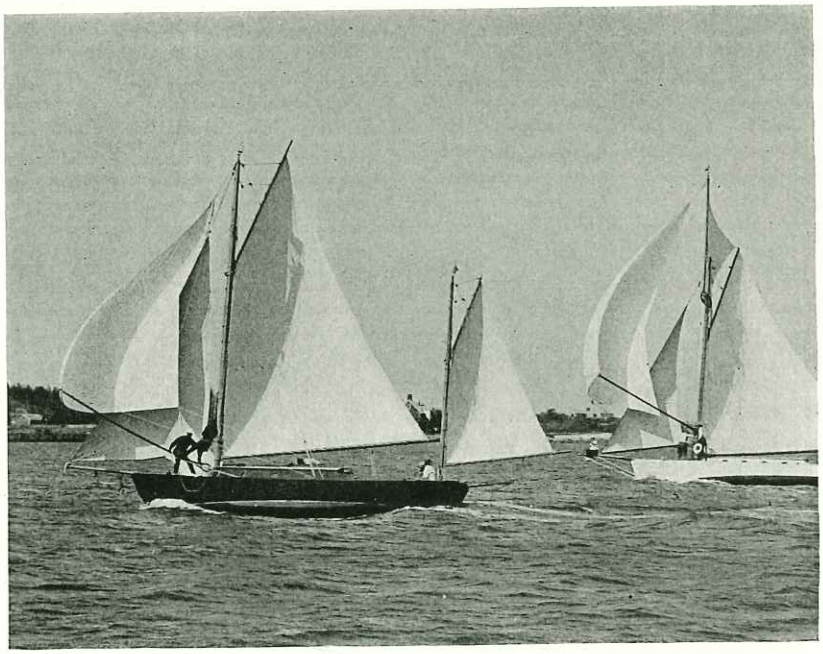
An enthusiastic yachtsman writes: "There is nothing like your Plymouth Yacht Rope for comfort in handling, besides which it outlasts any rope we have ever had."

General Equipment

IN addition to her anchor lines, which should be reserved and kept ready for anchoring purposes alone, every boat should carry a considerable quantity of rope for towing contingencies, heaving, rescue work and the like.

The size and length of these lines and the exact number of each carried will naturally depend on the size of the boat, the sort of waters she frequents and the duration and nature of her cruises.

It is obvious, however, that here, as in all else that concerns convenience and safety aboard ship, it is wiser to carry too much than not enough. And quite aside from the question of safeguarding oneself and one's own boat, there is the unwritten courtesy of the sea which should impel every true sportsman to carry the means of rendering any needed assistance to others.



AUXILIARY YAWL "NAUSHON" OWNED BY FRANK VINING SMITH, MARINE ARTIST. DESIGNED AND BUILT BY WALTER A. CROSS, FAIRHAVEN, MASS.

The harder it blows — the better she goes. Her rigging is all Plymouth Manila

Proper Use and Care of Rope

TO understand what constitutes proper use and proper care of rope, it is necessary to appreciate what things affect a rope's strength and durability.

Deterioration in rope is of two kinds — mechanical and chemical. The first comes either from surface wear or from internal friction between the fibers. The second comes from exposure to weather conditions and to acids.

Needless surface wear on running rigging or on any other ropes which work through blocks can easily occur if the sheave-holes are too small to permit easy clearance, or if the blocks become fouled in such a way as to bring the ropes out of proper alignment. Either of these conditions will cause the rope to chafe against the sheave and the block. The second may also cause a rope to chafe against other ropes or against something quite apart from the rigging.

All rope swells somewhat after being wet. Bear this in mind and use blocks with large enough sheave-holes to take care of the swelling. The same applies, of course, to fair-leaders of all kinds.

Internal friction between the fibers is always present to some extent in a rope working over a sheave. Eventually, this results in a breaking up of the fibers — sometimes in a loss of vitality through heat caused by the friction. The smaller the diameter of the sheave in relation to that of the rope, the greater this friction becomes. In few places is a rope subjected to such severe wear from this source as on running rigging. Take care, therefore, not only to use large enough rope to start with, but also to use sheaves of the largest diameter permissible. Your rope will last longer.

The breaking of the fibers which a rope suffers on both sides, when bent around a sharp corner and then subjected to a heavy strain, is considerable. Whenever possible, care should be taken, in making fast to anything, to select an object which presents a round and smooth surface. Deck cleats, whether of metal or wood should always have smooth surfaces. For hawse-pipes, or any other metal fittings which are to receive rope, composition metal is preferable to iron.

Keep all ropes clean and free from sand, mud or other matter containing grit. If allowed to remain and to work into a rope, grit becomes converted into a harmful grinding material.

Chemical deterioration from rotting, or what is usually referred to as "dry rot," generally occurs through a rope that is saturated

with water not being given a chance to dry out in the open air. Nothing will injure a rope more rapidly than to put it while wet into a stuffy locker.

Anchor lines and other ropes which have become thoroughly wet should always be coiled or, better still, spread out on deck and allowed to dry naturally. The lockers for your anchor lines, if you use lockers, should be so constructed as to afford ample opportunity for drainage and for the free passage of fresh air.

Another not infrequent cause of chemical deterioration in rope is contact with acid. The common commercial acids have a particularly injurious effect on fiber. The same is true of uric acid. Be careful where you store your rope and what you place near it.

It pays in the end to use the largest ropes permissible and convenient, to get the best ones obtainable and to take good care of them. The limit of safety on an undersized rope or on one made from poor material is reached so quickly as to more than offset any difference in first cost. It pays, also, to inspect all ropes frequently and to replace them before the limit of safety is reached.

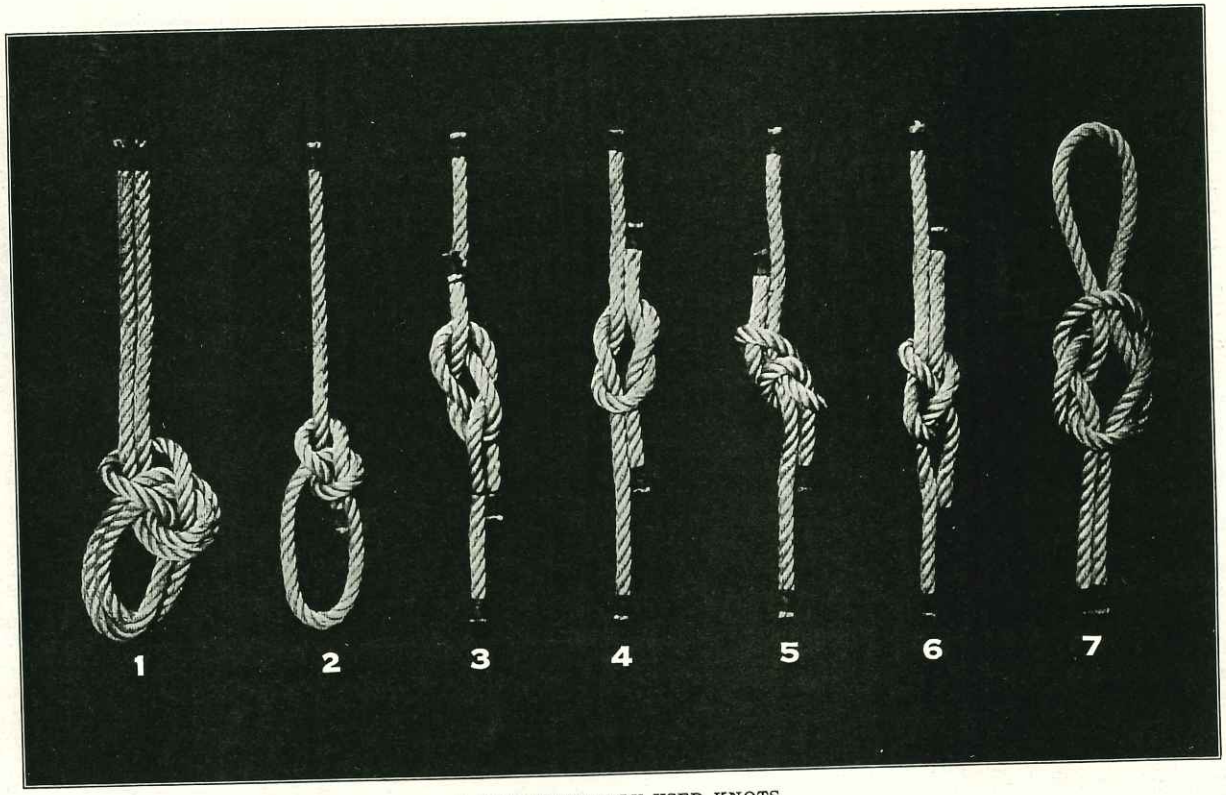
Loss of strength from heat or from rotting is difficult to note except through an actual test of the fiber. That from surface or internal wear can be judged by careful inspection. Open up your rope and see if it looks bright and firm between the strands. In general, a rope which has become "punky" or which has lost its stretch should be viewed with suspicion.

Large ropes lose strength through rotting much more slowly than small ones, the percentage of inner or protected fibers increasing proportionally to the square of the diameter. In ropes up to about ¾" diameter all the yarns appear on the outside of the rope. Working conditions and other things being equal, ropes of these smaller sizes call for replacement more frequently than do the larger ones.

The Cape Cod Baby Knockabout

ENOUGH SAID—The President of the Cape Cod Shipbuilding Company at Wareham, Mass., recently wrote us as follows:

"I want to say again that we are using Plymouth Rope exclusively. Only a day or so ago a man came in who appeared to be very critical about our output, and he seemed to be a boat man and knew his business. Finally, after looking over the whole outfit from hull to sails, he said, 'What sort of rigging are you using?' I replied, 'Plymouth Rope altogether.' He said, 'Good enough,' I am sure of his order."



A FEW COMMONLY USED KNOTS

1. Bowline in a Bight
2. Bowline
3. Carrick Bend
4. Square Knot
5. Fisherman's Knot
6. Weaver's Knot
7. Jar Sling

Knots, Hitches and Splices

PROMPTED by many manifestations of interest attached to the subject of knot-tying and rope-splicing, we welcome this opportunity of treating with the subject in a general way, believing that the ability to tie a few useful knots and to splice a rope, as occasion sometimes requires, may prove of practical knowledge to many of our readers.

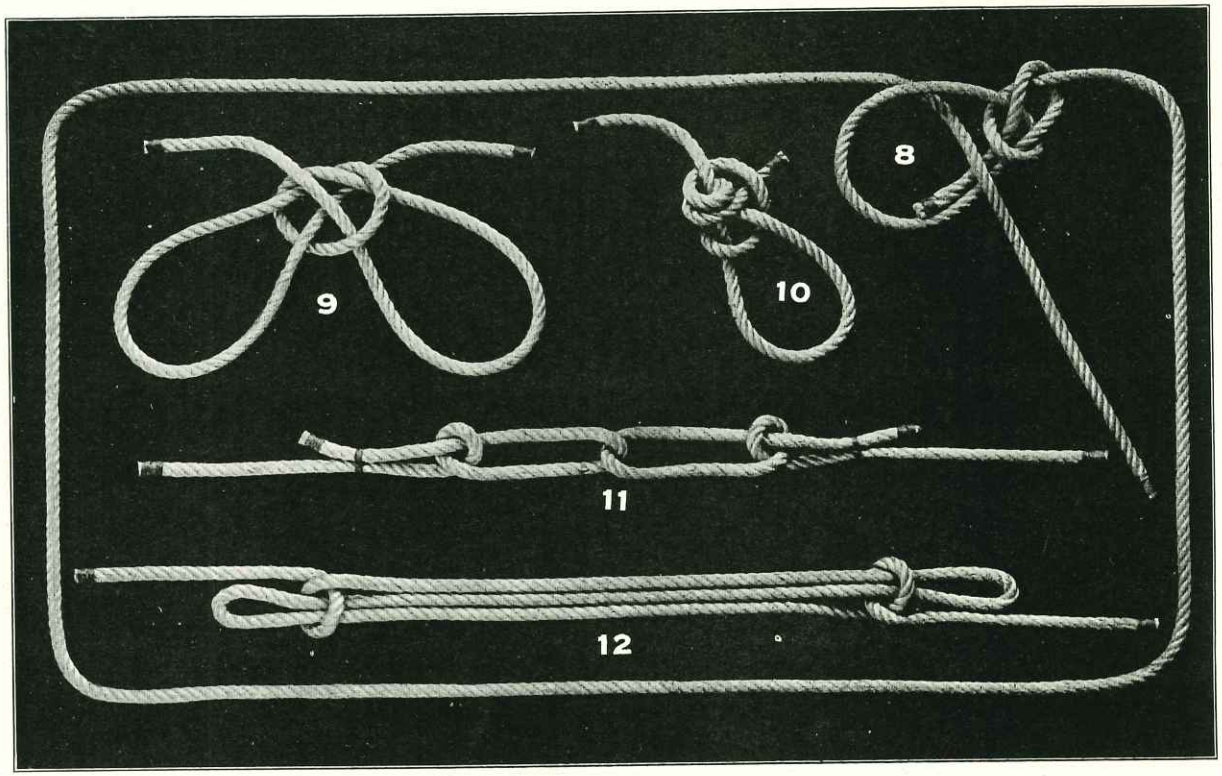
Figures 1 and 2 are both bowline knots; No. 1 being a bowline in a bight or double bowline, while No. 2 is a simple bowline. The bowline is one of the most useful knots to know, and is used wherever a loop is wanted that will not slip or pull tight. To make the simple bowline, Fig. 2, lay end of rope over standing part, which forms a loop; termed "throwing a bight." Bring end of rope up through bight, leading end around the standing part and down through bight again.

The Double Bowline, Fig. 1, is used when a loop is desired in the middle of a rope. To tie the double bowline, take the bight of the rope and proceed the same as with the simple bowline, only instead of tucking end down through the bight of the knot, carry the bight over the whole and draw up, thus leaving it double in the knot and double in the standing part, but the loop under the standing part is single.

The Carrick Bend, Fig. 3, is used for joining two stiff or heavy hawsers. A bight is first formed by laying the end of one rope over the standing part. The end of the other rope is passed down through the bight, then straight up over the cross and down through the bight again, so that it comes out on the opposite side from the other end, thus bringing one end on top and the other below. With heavy lines it is well to secure the knot by seizing the ends to the standing parts.

The Square Knot, Fig. 4, is widely used for tying small ropes and twines. It is easily tied by taking the ends of the rope, passing the left end over and under the right end, then the right end over and under the left. The square knot is strong, and the harder the pull the more firmly does it hold. If our simple directions are followed, the frequent mistake of forming the useless Granny knot will not be made.

The Fisherman's Knot is illustrated by Fig. 5. This is a useful and valuable knot for anglers, as the name implies. It is made by tying an overhand knot in each line over the standing part of the other line. When this is drawn taut it will not slip.



PRACTICAL KNOTS

8. Running Bowline
9. Tomfool Knot
10. Midshipman's Hitch
11. Half-Hitch and Seizing
12. Sheepshank

The Weaver's Knot, Fig. 6, obtains its name from universal use in textile mills for tying threads and yarns. It is a secure fastening for small lines and is easily made; first, by forming a loop in one end of the line. The other line is passed up through the loop and underneath the end and standing part, then down through the loop just formed.

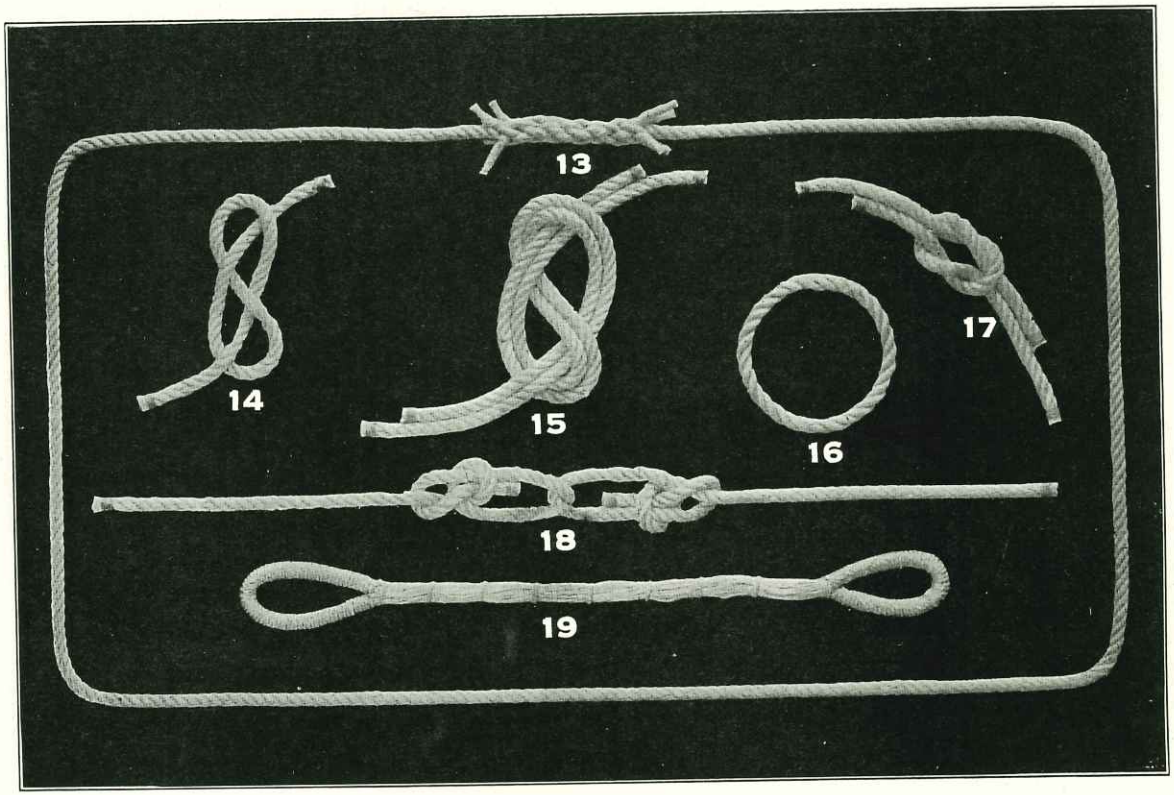
The Jar Sling, Fig. 7, is used for setting up the jury mast in boats or small vessels. It is also used for slinging barrels, casks, etc., when it is desired to hoist them perpendicularly. To make the jar sling, take the bight of a rope and turn bight up over the two standing parts, making two loops or bights in the rope. Put hand down through the right-hand loop and grasp the left loop, bringing it up through the right loop and over the first rope that lies across the standing parts. Take up the slack of the first loop with hand down through and under the second loop, grasping the first rope and pulling the slack through.

The Running Bowline, Fig. 8, serves as an excellent slipknot, as it slips freely and cannot jam or unfasten. It is nothing more than a simple bowline with the long end or standing part of the rope passed through the large loop.

Fig. 9 illustrates a peculiar slipknot known as the Tomfool Knot. Its name is derived from the deceptive manner in which it is tied, and is a good illustration of how the quickness of the hand deceives the eye. The rope is first placed across the palm of both hands, fingers of the right hand pointing out and fingers of the left hand pointing in. With the right hand throw a bight around the left hand, and with the first two fingers of the right hand grasp the loop in the left hand, while with the first two fingers of the left hand grasp the loop in the right hand, drawing through, thus making the knot. The Tomfool Knot has become quite famous in use for emergency handcuffs, for if the wrists are placed within these loops, the latter drawn taut and the loose ends tied firmly around the central part, a pair of wonderfully secure handcuffs results.

Fig. 10, the Midshipman's Hitch, is used principally to make fast the sheets of small boat sails. Its construction is obvious — a half hitch around the standing part and a round turn twice around above it — the hitch being fastened by bringing the end of the rope through the loop which remains.

Formation of the Half-Hitch and Seizing, Fig. 11, is also evident at a glance. It is in popular use for permanently joining heavy



KNOTS, HITCHES AND SPLICES

13. Rope Sling with Short Splice
14. Figure Eight Knot
15. Double Figure Eight Knot
16. Grommet
17. Bread Knot
18. Bowline Hitch
19. Selvagee Strap

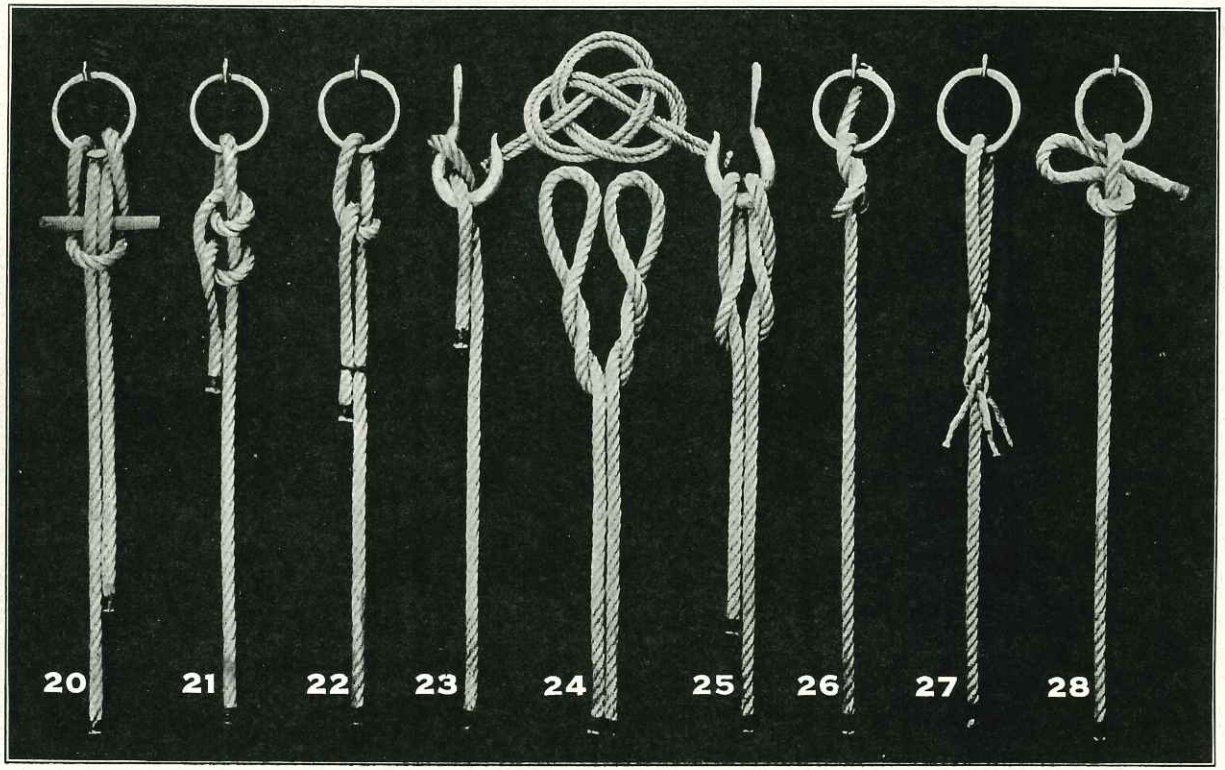
hawsers, as it allows the rope to be handled and coiled more readily than is the case with certain other knots.

For a quick shortening in the center of a rope when both ends are made fast, the Sheepshank is widely used. A simple loop is first made and a hitch or bend placed through it as shown in Fig. 12. The Sheepshank is easily made, but in order to make it entirely dependable the loops at the ends should be seized to the standing parts of the rope.

Figure 13, which we have utilized as a border design for our illustration, is a Rope Strap or Sling made with a short splice. It is largely used in all engineering work for heavy hoisting purposes, the strap being wrapped around the casing or machinery to secure a purchase or fastening for the lug tackle. The short splice used in making this strap is easily made. The ends of the rope should first be unlaid for a few inches and seized to prevent unraveling. Likewise the ends of each strand. Place the two ends of the rope together, laying the strands one within the other, and drawing them together as closely as possible. Now take the opposite strands and tie with overhand knot, pulling up tightly. The ends should then be tucked between the strands, tucking over the first strand which is next to it, and through under the second and out between the second and third. Two tucks on each end after the overhand knot above referred to will be sufficient to insure satisfactory strength in the splice.

The Figure Eight Knot, Fig. 14, is made from a loop by passing the end around the standing part in a second loop, and then back through the first loop. The Double Figure Eight Knot, Fig. 15, is used where there is too much rope. Both the Single and Double Figure Eight Knots are used on shipboard when it is desired to keep the rope from running through an eye, ring or block.

The Grommet, Fig. 16, is an endless ring of rope which is very useful aboard ship as well as ashore. It is principally used as handles for chests and for rings with which to play quoits. The Grommet is best formed by using a single strand of rope five times as long as the circumference of the Grommet when complete. The proper size loop is first made, and the long end of the rope is led around following the grooves or "lay" of the strand until back to where the start was made, thus forming a two-stranded ring. Then continue twisting the free end between the turns already made until the three-strand ring is complete. The two ends are now tied with an overhand knot and the remaining ends passed underneath



HITCHES AND TIES

20. Lark's Head with Toggle
21. Two Half Hitches
22. Half Hitch
23. Blackwall Hitch
24. Catspaw (Tying)
25. Catspaw (Finished)
26. Capstan Knot
27. Eye Splice
28. Slippery Hitch

the nearest strands and trimmed closely. If a strong twist is kept on the strand while laying up the Grommet, the finished ring will be as firm and smooth as a finished rope.

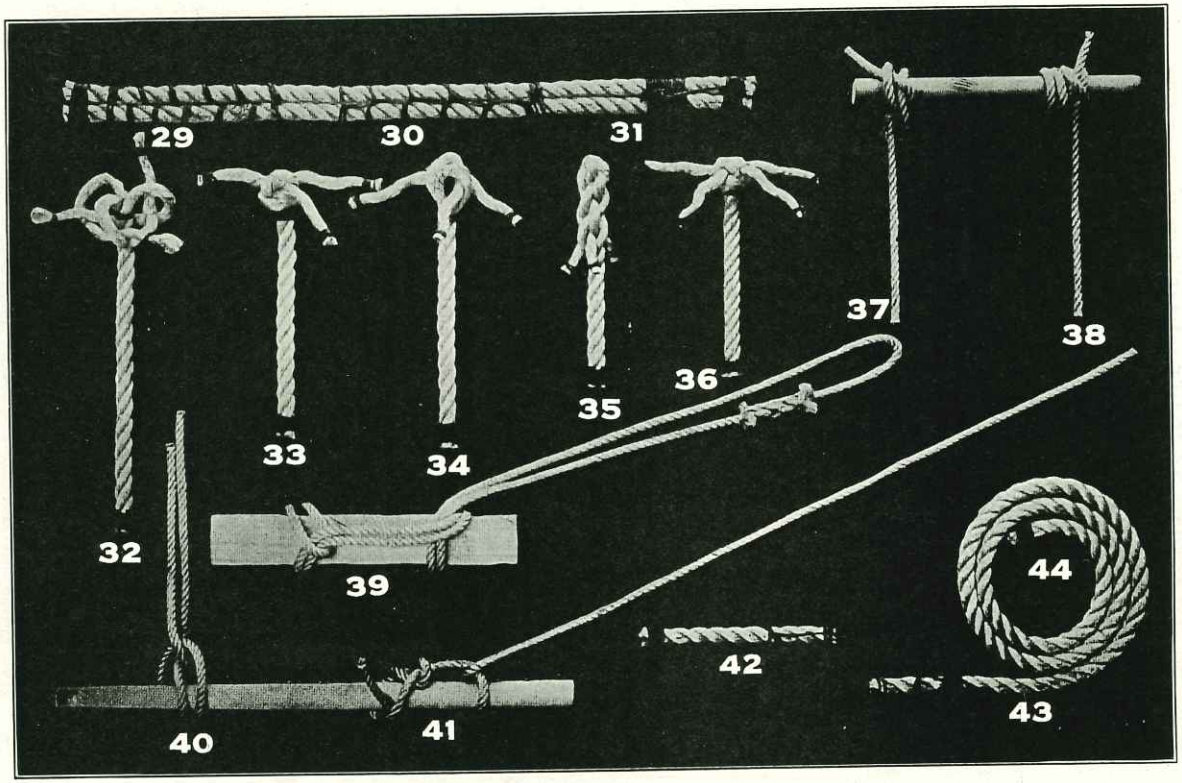
The Bread Knot, Fig. 17, is in reality nothing more than a square knot, except that the two ends come out on opposite sides. This knot is shown that we may have opportunity for spinning a sailor's yarn. It was the practice of the Captain of a Cape Cod vessel to keep a canvas cover on his bread kit, secured by a small rope tied with a square knot. He became suspicious that the bread was disappearing more rapidly than the daily ration of the crew warranted, so he secured the canvas cover with the knot tied as per our illustration. At his next visit to the kit he found it securely fastened, but with a properly made square knot. Suspicion pointed to two of the younger members of the crew, and the term "Bread Knot" was born to furnish the subject of this oft-repeated story.

The Bowline Hitch or Bend, Fig. 18, is perhaps the strongest of all the knotted hawser bends. It is formed of two bowline knots, one crossing the loop of the other.

The Selvagee Strap, Fig. 19, is stronger than a spliced rope strap of the same number of yarns, as every yarn lays straight and with the same tension, and is free from the shearing strain present in the rope. It is made by passing the yarns around wooden pins or nails set in a board and spaced according to length of strap desired. The whole is then bound together with a seizing of yarn or marline. This makes a very strong and durable strap for use in hoisting heavy weights. When rope of sufficient strength is far distant the Selvagee Strap made from waste yarns or binder twine offers the farmer a serviceable sling.

Most of the knots thus far described and illustrated are principally used for fastening the two ends of rope and for joining two ropes together. It is our purpose now to treat with a somewhat different class of knots which are commonly used for making a rope fast to a stationary or fixed object. These are best termed as "hitches" or "ties." The security of such a fastening is dependent upon pressure of the standing part upon the end, and under certain limitations the greater the pull or load the stronger the hitch will hold. Once the strain is eased up, a hitch from its very simplicity is readily cast off.

Lark's Head with Toggle, Fig. 20, is one of the very easiest of this class to tie. It is frequently used as a boat fastening and may be



KNOTS, HITCHES AND SPLICES

29. Racking
30. Marling
31. Necklace Tie
32. Wall Knot (Beginning)
33. Wall Knot (Complete)
34. Single Crown (Beginning)
35. Single Crown (Complete)
36. Wall Knot (4-Strand)
37. Studding-Sail Bend
38. Rolling Hitch
39. Strap and Half Hitch
40. Clove Hitch
41. Timber Hitch
42. Whipping (Beginning)
43. Whipping (In Process)
44. Whipping (Finished)

released instantly by pulling out the toggle or pin. The bight of the rope is passed up through the ring, and a marline spike or wooden pin is wedged through the sides of the bight and under or behind the standing part as shown. This makes the fastening secure. The end of the rope may be left free or finished with a half hitch.

Fig. 21 represents an ideal and quickly tied fastening. Two Half Hitches can be tied with but little practice from a glance at our illustration. This will hold forever without loosening, and even when thrown around a smooth, round spar it will stand tremendous strain without slipping. If the single Half Hitch is used, Fig. 22, the end should be seized to the standing part as illustrated.

The Blackwall Hitch, Fig. 23, is one of the simplest hitches to make and is of very great practical value. It consists of a loop with the end of the rope passed under the standing part and across the hook. Under strain, the hauling part jams the end against the hook. This hitch will carry a heavy load providing the tension is constant.

The Catspaw is illustrated by Figures 24 and 25. This is a readily made and useful hitch to employ for hoisting work. By passing the bight of your rope over the end and standing part, and twisting each of the two bights thus formed a result is obtained like Fig. 24. The two loops thus formed in the bights are now brought together and thrown over the hook, making a fastening that will not pull out, and which at the same time admits of instant release.

An excellent mooring knot for the painter of a small boat is illustrated in Fig. 26, the Capstan Knot. In construction it is nothing more than a simple Figure Eight Knot described on page 18.

For a permanent ring fastening and for splicing 'round a block or thimble, the Eye Splice, Fig. 27, is in very general use. The method of making is identical to the Short Splice, described on page 19, except, of course, the end after being unlaid and bent around, forming the eye, is spliced into its own strands of the standing part.

Fig. 28 illustrates what is called "The Slippery Hitch." This is used for a temporary fastening and very frequently for hitching a horse. It is made by running the end of the rope through the ring or eye to which it is being fastened, then back over the standing part, pulling a loop through the bight thus formed. To untie, the free end is pulled.

In completion of this present series of knots, hitches and splices most commonly used, we illustrate on page 22, various methods for

finishing the end of a rope or for completing certain kinds of knots, termed "whipping" and "seizing," as well as other methods for securing ropes temporarily and for emergency use in securing a broken strand on a running rope. Such fastenings are usually made with spunyarn, marline and other tarred fittings.

Fig. 29 illustrates the method known as "Racking," which is used to fasten temporarily the two standing parts of a fall or tackle when a Lug Tackle is also used, the racking making all secure while fleeting the Lug Tackle. The tarred fitting is first doubled and carried around the two parts of the rope, after which the ends are brought through the bight under one part and over the other, hauling tightly, and for such a distance along the rope as will amply secure the parts. The racking is finished with a square knot.

Fig. 30, Marling, is frequently used to secure a broken strand in a running rope. Begin the same as in the racking, after which a number of half hitches are taken around both parts to secure. This is likewise finished with a square knot.

The method of seizing, Fig. 31, is often called the "Necklace Tie." It is simply used to secure two ropes, as has been illustrated in finishing some of the knots earlier described in this series. Begin the same as in racking and marling, then divide the ends, carrying in opposite directions around the two parts of the rope several times. The ends are now crossed and brought between the standing parts several times, which tautens the turns about the rope. The seizing is finished with a square knot.

Fig. 32 illustrates the first process in making a simple Wall Knot and shows the interlacing of the strands one within the other. Fig. 34 illustrates the second process. When these are drawn taut the knot is finished, as shown by Fig. 33.

The Single Crown Knot is illustrated by Figures 34 and 35. This is practically the Wall Knot, reversed with the ends left long enough to tuck under the strands of the standing part as in a short splice. The Single Crown Knot makes an excellent finish to a rope's end.

Fig. 36 represents the Wall Knot when made with a 4-strand rope. Its construction is quite apparent.

For holding spars on shipboard the Studding-sail Bend, Fig. 37, is in favorite use. It is in reality an Anchor or Fisherman's Bend, except that the end of the rope is brought back again over the last round turn and under the first.

The Rolling Hitch, Fig. 38, is used principally for attaching a rope

to an upright stay or spar. It is also sometimes attached as a support to another rope when under strain. It is a modification of the Clove Hitch, but has an extra round turn over the spar and the standing part of the rope before the final half hitch is made.

Fig. 39 illustrates the method of using a strap when several pieces of boards are hoisted on end at one time. The strap being put on in the ordinary way and the Half Hitch above prevents the boards from slipping out.

The Clove Hitch, Fig. 40, is a simple method for fastening a rope around a spar or other object. It is also called the Builder's Hitch, because of its extensive use in fastening staging to upright posts. To make, pass the end of rope around the spar or timber, then over itself; over and around the spar, and pass the end under itself and between the rope and spar, as shown in illustration.

For towing and hauling lumber, the Timber Hitch, Fig. 41, is in general use among lumbermen and pile drivers. It is made by passing the end of the rope around a spar or log, around the standing part of the rope and then twist it three or four times around, under and over itself. To make the Timber Hitch still more secure a single Half Hitch may be taken a little farther along the spar.

To bind or "whip" the end of a rope, a simple method is illustrated by Figures 42, 43 and 44. A bight is first formed in the marline and the twine wrapped around several turns as shown. Now thread through the loop and finish by drawing loop tight by pulling on the free end. In this manner both parts of the tie are pulled under the wrapping.

Determining the Proper Factor of Safety and Size of Rope for Tackle

TO find the power required to lift a given weight when the number of parts at the movable block is known — the weight to be lifted by the tackle divided by the number of parts at the movable block will equal the necessary pull on the fall, theoretically.

A safe rule for friction is to allow 10% friction loss for each sheave 3″ diam. and above, add total friction to load, and proceed as if friction were not present.

Let us assume 5000 lbs. to be lifted by a tackle — two double blocks—4 sheaves and 4 parts at the movable block.

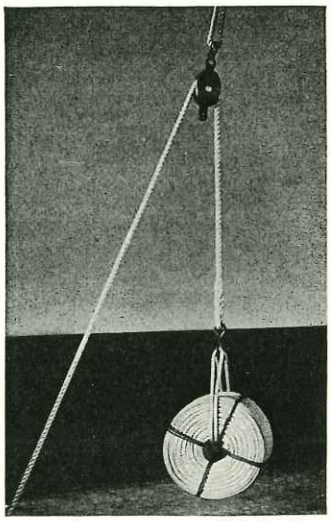


Figure I

Single whip — 1 sheave. No mechanical advantage. Friction load — 1 sheave — 10%. 100 lb. weight to be lifted. 100% — 10 = 90% efficiency.

$\frac{100}{.90}$ lbs. = 111 lbs. to lift load.

4 x 10% = 40%. 5000 lbs. + 40% = 7000 lbs.

7000 lbs. ÷ 4 = 1750 lbs. strain on fall.

Assuming a factor of safety of 5 – 1 as most desirable – 1750 × 5 = 8750 lbs. breaking strain required of rope.

Plymouth Manila Rope 1-inch diam., 3-inch circ. minimum break 8200 lbs. is a safe rope to use. (See Plymouth Weight and Strength Card.)

NOTE: To secure greatest advantage block from which the fall leads should be attached to the weight to be moved.

NOTE: Snatch or lead blocks increase friction without increasing advantage.

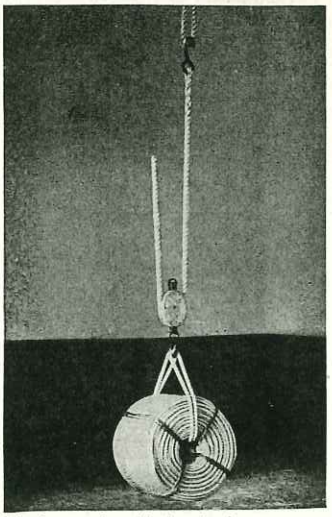


Fig. II Single running block. 1 sheave — mechanical advantage 2. Friction load 10% each sheave. 100 lb. weight to be lifted. $\frac{100 \text{ lbs.}}{2 \times .90} = 100 \div 1.80 = 55.5$ lbs. to lift load.

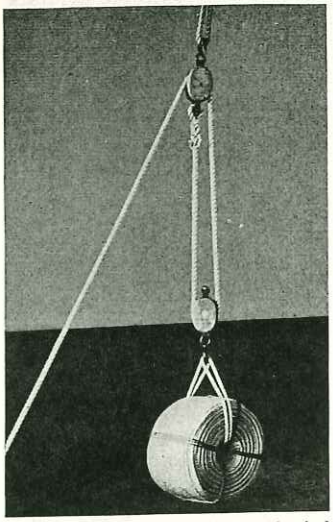


Fig. III 2 single blocks. 2 sheaves — mechanical advantage 2. Friction load 10% each sheave. 100 lb. weight to be lifted. $\frac{100 \text{ lbs.}}{2 \times .90 \times .90} = 100 \div 1.62 = 61.75$ lbs. to lift load. More power required than in Figure II, but of greater utility. The increased friction gives better control of load.

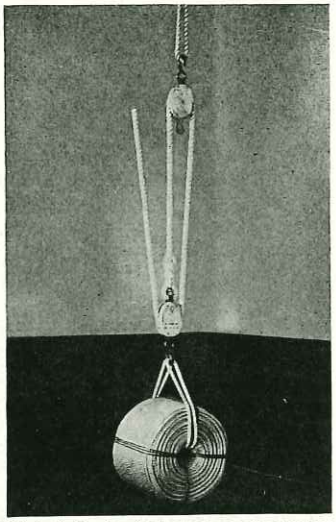


Fig. IV 2 single blocks. 2 sheaves — same number as Figure III, but position of tackle reversed. Mechanical advantage 3. Friction load 10% each sheave. 100 lb. weight to be lifted. $\frac{100 \text{ lbs.}}{3 \times .90 \times .90} = 100 \div 2.43 = 41.4$ lbs. to lift load.

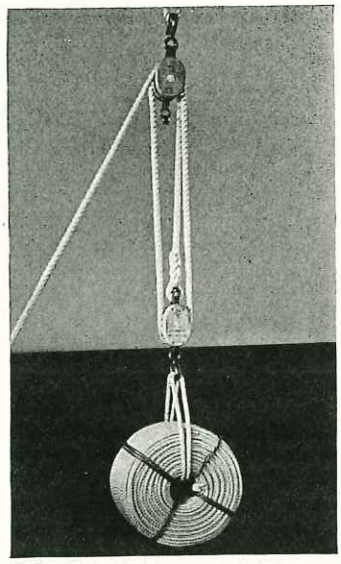


Fig. V Gun tackle — 1 single and 1 double block — 3 sheaves. Mechanical advantage 3. Friction 10% each sheave. 100 lbs. to be lifted. $\frac{100}{3 \times .90 \times .90 \times .90} = 100 \div 2.18 = 45.75$ lbs. to lift load.

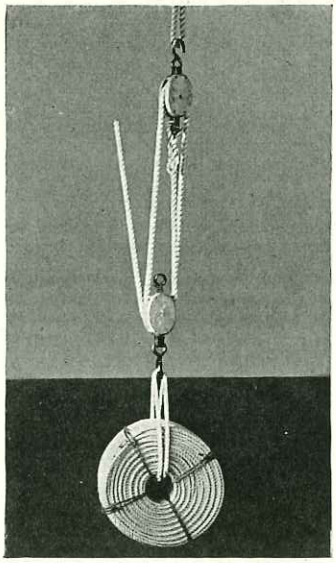


Fig. VI Gun tackle, same as Fig. 5, but position of tackle reversed — 3 sheaves. Mechanical advantage 4. Friction 10% each sheave. 100 lbs. to be lifted. $\frac{100}{4 \times .90 \times .90 \times .90}$ = 100 ÷ 2.91 = 34.3 lbs. to lift load.

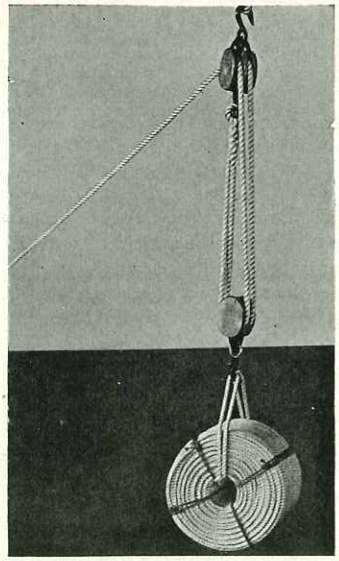


Fig. VII 2 double blocks—4 sheaves. Mechanical advantage 4. Friction loss 10% each sheave. 100 lbs. to be lifted. $\frac{100}{4 \times .90 \times .90 \times .90 \times .90}$ = 100 ÷ 2.62 = 38.4 lbs. to lift load.

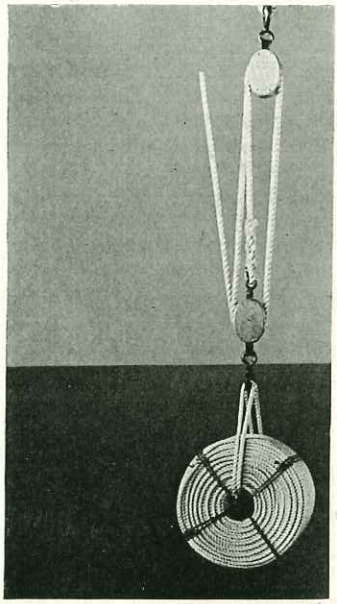


Fig. VIII 2 double blocks, same as Fig. 7, but position of tackle reversed — 4 sheaves. Mechanical advantage 5. Friction 10% each sheave. 100 lbs. to be lifted. $\frac{100}{5 \times .90 \times .90 \times .90 \times .90}$ = 100 ÷ 3.28 = 30.5 lbs. to lift load.

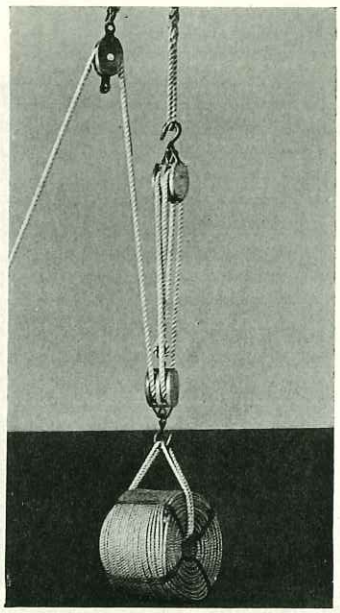


Fig. IX 2 double blocks with lead or snatch block — 5 sheaves. Mechanical advantage 5. Friction 10% each sheave. 100 lbs. to be lifted. $\frac{100}{5 \times .90 \times .90 \times .90 \times .90 \times .90}$ = 100 ÷ 2.95 = 33.9 lbs. to lift load.

Rope Tackle

Terms and Definitions

Tackle — A combination of ropes and blocks for the purpose of increasing power. What is gained in power is lost in speed. If the power is increased four times by the use of double blocks, the hauling part must move through four feet to move the block one foot.

Block — A frame of wood, steel or other metal, within which are fitted sheaves or pulleys over which a rope may be led. It multiplies power in the ratio of sheaves used. Blocks are designated as single sheave, double sheave, or simply as single, double or treble.

Strap — Blocks are equipped with straps, iron or steel; once fiber rope was used. A hook or shackle is usually attached to the strap at one end of the block that it may be suspended and attached to the weight to be moved or raised.

Cheeks — The side pieces of the frame of a block.

Swallow — The space between the sheave and frame of the block through which the rope passes.

Breech — The end of the block opposite the swallow.

Sheave — The wheel or grooved pulley in a block over which the rope runs.

Snatch Block — Single sheave blocks hooked to eye bolt or rope strap to give a fair lead to the hauling part of the tackle.

Fall — The part of a rope or tackle to which the power is applied in hoisting.

Nautical — The tackle used in hoisting the ship's boat or other object as boat falls, cargo falls.

Luff Tackle — Watch Tackle — Handy Billy — A tackle composed of a single and double block — often used on the hauling part of a heavy tackle to increase power.

Whip — A purchase consisting of a single block and rope "single whip." A similar purchase with two blocks is called a "double whip."

Topping Lift — A tackle or rope leading from the head of a mast of a vessel or derrick employed to raise or top the end of a boom.

Strap or Strop — A rope with ends spliced together, "usually a short splice," used in suspending or making fast a tackle, or around the object lifted. Sometimes called a sling, as hoisted or lowered in slings.

Lashing — A piece of rope used to bind anything.

Nautical — Hammock lashing. A lashing is often used in place of strap in hoisting heavy weights.

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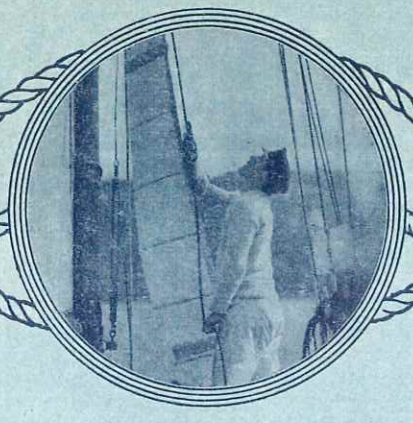
APPROXIMATE GROSS WEIGHT AND STRENGTH

COMMON LAY THREE-STRAND PLYMOUTH MANILA ROPE

Name and Size in Circumference	Approx. Diameter	Length and Weight Standard Coil		Minimum Tensile Strength New Manila Rope Laboratory Test	Length of Rope in One Pound
		Feet	Pounds		
6thd. 9/16"	3/16 in.	3,333	50	480	66 ft. 8 in.
6thd. 3/4"	1/4 "	2,750	50	620	55 "
9thd. 1"	5/16 "	1,820	50	1,000	36 " 4 "
12 thd. 1 1/8"	3/8 "	1,350	65	1,275	27 "
1 1/4 in.	7/16 "	1,200	75	1,750	18 " 6 "
1 3/8 "	15/32 "	1,200	90	2,100	16 "
1 1/2 "	1/2 "	1,200	125	2,450	13 " 4 "
1 3/4 "	9/16 "	1,200	160	3,150	9 " 7 "
2 "	5/8 "	1,200	198	4,000	7 " 6 "
2 1/4 "	3/4 "	1,200	234	4,900	6 " 1 "
2 1/2 "	13/16 "	1,200	270	5,900	5 " 1 "
2 3/4 "	7/8 "	1,200	324	7,000	4 " 5 "
3 "	1 "	1,200	378	8,200	3 " 8 "
3 1/4 "	1 1/16 "	1,200	432	9,500	3 " 2 "
3 1/2 "	1 1/8 "	1,200	504	11,000	2 " 9 "
3 3/4 "	1 1/4 "	1,200	576	12,500	2 " 5 "
4 "	1 5/16 "	1,200	720	14,200	2 " 1 "
4 1/2 "	1 1/2 "	1,200	900	17,500	2 " 8 "
5 "	1 5/8 "	1,200	1,080	21,500	1 " 4 "
5 1/2 "	1 3/4 "	1,200	1,296	25,500	1 " 1 "
6 "	2 "	1,200	1,512	30,000	11 "
6 1/2 "	2 1/8 "	1,200	1,764	34,000	9 1/2 "
7 "	2 1/4 "	1,200	2,016	38,500	8 "
7 1/2 "	2 1/2 "	1,200	2,304	43,500	7 "
8 "	2 5/8 "	1,200	2,590	49,000	6 1/4 "
8 1/2 "	2 7/8 "	1,200	2,915	55,000	5 1/2 "
9 "	3 "	1,200	3,240	61,000	5 "
9 1/2 "	3 1/8 "	1,200	3,600	67,000	4 1/2 "
10 "	3 1/4 "			73,000	4 "

Four-strand Rope — standard lengths of coils — sizes 1 1/4" cir. to 3 1/4" cir. inclusive 1200' — 3 1/2" cir. and larger 1150' — weight approximately 5% heavier. Tensile strength approximately same as 3-strand. Approximate relative strength of fiber rope expressed in percent: Manila 100, New Zealand 82, Sisal 67.

Form 150 B



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